



An Overview of CMMI Appraisal Methodology

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CMMI Appraisal Method Status

V1.0 assessment products published in October 2000

- **Assessment Requirements for CMMI (ARC)**
- **Standard CMMI Assessment Method for Process Improvement (SCAMPI)**

Several pilot appraisals performed in 2000 (Phase I) and 2001 (Phase II)

V1.1 primary objectives:

- **Performance improvements**
- **Integrated appraisal method (assessments and evaluations)**
- **Detailed method definition and guidance**

ARC and SCAMPI revisions currently in final stages of development and review



Performance Goals

On-site activities completed within 2 weeks (100 hrs), excluding training and pre-onsite activities

- **CMMI-SE/SW v1.02, ML3 scope**
- **4 projects**
- **SE and SW disciplines**
- **Organization prepared and familiar with CMMI model and implementation**



Model Metrics

<u>Release</u>	<u>PAs/ FAs</u>	<u>Goals/ Themes*</u>	<u>Activities/ Practices**</u>
SW-CMM V1.1	18	52	316
SW-CMM V2C	19	62	318
EIA/IS 731	19	77	383
IPD-CMM V0.98	23	60	865
CMMI V1.0 SE/SW	22	70	417
CMMI V1.02 SE/SW/IPPD	24	76	460

Summary Metrics:

61	199	1566
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* Ratable components

** Key to implementation effort



Essential Method Attributes*

1. Accuracy	Ratings are truly reflective of the organization's maturity/ capability, reflects the reference model, and can be used for comparison across organizations. Level of confidence that the appraisal results reflect the strengths and weaknesses of the assessed organization; i.e., no significant strengths and weaknesses are left undiscovered.
2. Repeatability	The degree to which the ratings and findings of an appraisal are likely to be consistent with those of another independent appraisal conducted under comparable conditions; i.e., another appraisal of identical scope will produce consistent results.
3. Cost/Resource Effectiveness	Person-hours spent planning, preparing, and executing an appraisal. A reflection of the organizational investment in obtaining the appraisal results. Includes the resources of the host organization, impact on assessed projects, and the assessment team.
4. Meaningfulness of Results	Usefulness of the results (findings) to the organization in establishing improvement initiatives.
5. Stability of the CMMI Product Suite	Reflects the relative extent of change... and potential impact on investment by adopters of the product suite. An indicator of evolutionary, rather than revolutionary, changes to the CMMI v1.0 baseline.
6. ARC Compliance	Compliance with ARC v1.0 requirements, in addition to ARC modifications generated to reflect the addition of evaluation requirements.

* Derived from prioritized list of factors developed at GEIA conference workshop (2000) and documented in AMIT charter.



Evaluations

DoD sponsor request for integrated CMMI appraisal method

- Internal Process Improvement (Assessments)
- External Supplier Selection and Monitoring (Evaluations)

Leverage approaches in SCE v3.0 method description and implementation guide

Focus on method; avoid non-technical issues relating to deployment

- Policy, resources, training, etc.

Method requirements developed by DoD / Industry Software Evaluation IPT

CMMI Project

a joint activity of Government, Industry, and the Software Engineering Institute



January 16, 2001

Dr. Jack Ferguson
DUSD(S&T)/SIS
Crystal Mall 3, Suite 104
1931 Jefferson Davis Hwy
Arlington, VA 22202

Dear Dr. Ferguson,

The CMMI Steering Group, and its Assessment Methodology Integrated Team (AMIT), are uniform in their support of an integrated appraisal method for assessments and evaluations. In the interest of maintaining schedule for a Fall 2001 release of the CMMI v1.1 product suite, the AMIT is being directed to focus primarily on the technical issues of such an approach, based on experience with the SCE v3.0 method. The guidance of the DoD/Industry Software Evaluation IPT on requirements for an evaluation method will also be considered.

In an attempt to provide sufficient stakeholder involvement in development of the appraisal method, additional Government representation from the evaluation / acquisition community will be added to the AMIT. However, even this may not be reflective of all interests within the Government evaluation community at large, nor can the AMIT address all issues relative to Government policy or deployment of the integrated appraisal method and the constraints this implies. Therefore, the SCAMPI v1.1 release can be considered a stable method for assessments and a candidate for government evaluations that will be improved upon over time. Additionally, we recommend other means to obtain Government involvement, such as through the Software Intensive Systems (SIS) Steering Group.

Sincerely,

(Original Signed By)
Michael R. Nicol
CMMI Steering Group
Government Co-Chair

(Original Signed By)
Robert C. Rassa
CMMI Steering Group
Industry Co-Chair



SCAMPI Method Definition Document

Elaborate the overview method description in v1.0 SCAMPI MDD with detailed method guidance

Clarify method requirements and tailoring

Support appraisal modes of usage

- Internal process improvement, supplier selection and monitoring

Target the material to meet needs of multiple audiences

- Executives, sponsors, appraisal team leaders, appraisal team members



Appraisal Method Improvement Sources

Existing appraisal methods and standards

SCAMPI pilots

Community feedback

- **ARC / SCAMPI v1.0 change requests (CRs)**
- **Appraisal method essential characteristics**
- **Appraisal best practices**
- **Performance improvement ideas**



ARC / SCAMPI Improvement Strategy

Shift appraisal team focus from discovery to verification

- **Leverage pre-onsite analysis of organization model implementation (documentation, mapping, etc.)**

Integrated data collection and continuous consolidation

- **Prioritize areas for remaining investigation based on data collection, analysis, and sufficiency of coverage (i.e., “triage”)**

Provide detailed method definition and implementation guidance

- **Support clarity, consistency, repeatability**
- **Organize content for efficient usage in the field**



Characterizing ARC Appraisal Classes

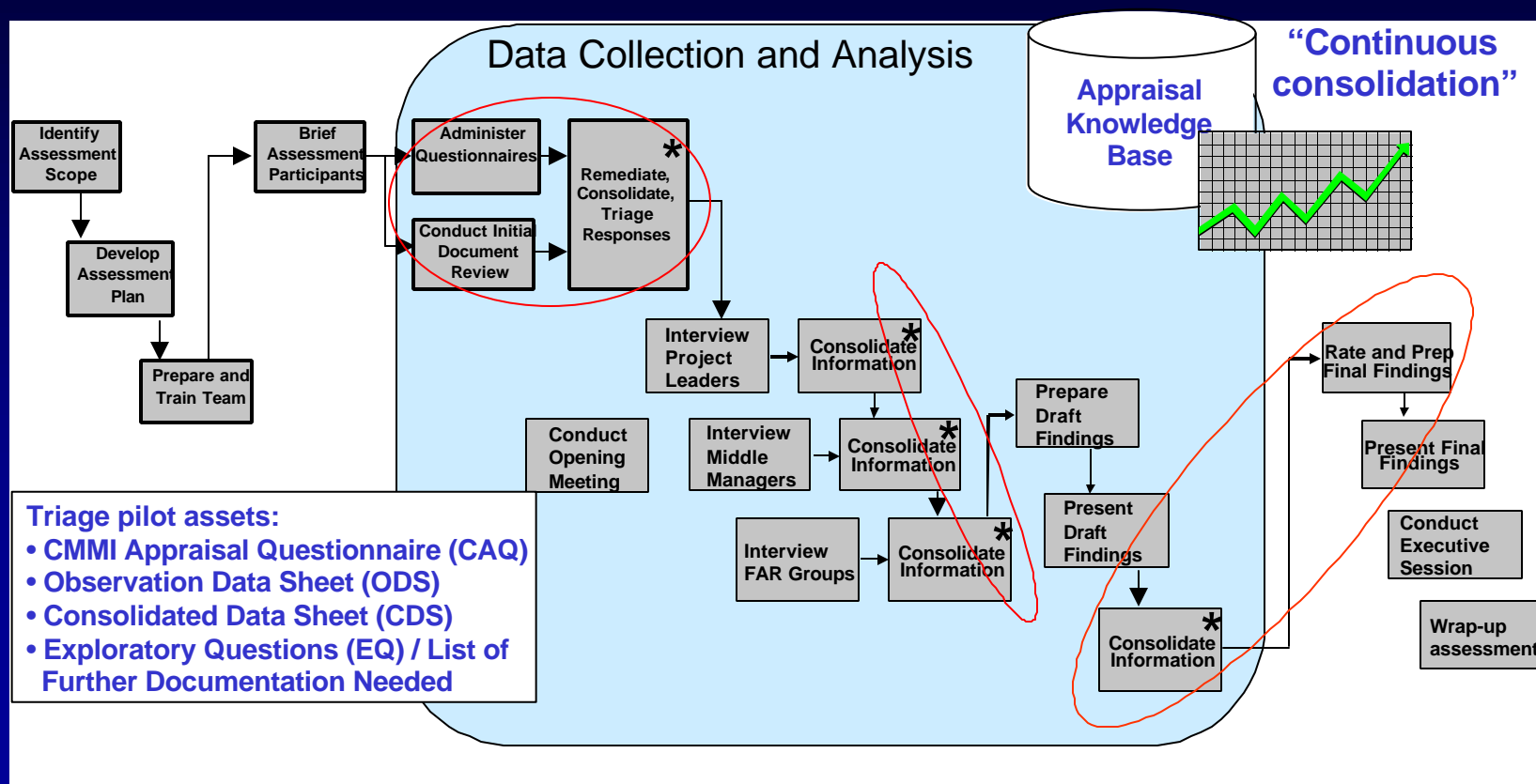
Summary	Class A	Class B	Class C
Characteristics applicable	All	Most	Some
Amount of objective evidence gathered	High	Medium	Low
Ratings generated	Yes	No	No
Resource needs	High	Medium	Low
15504 conformance	Yes (optional)	No	No
Team size	Large	Medium	Small

- Consider a family of appraisal methods in determining overall appraisal needs
- Class A methods may not be the most appropriate choice for organizations early in their process improvement cycle



Continuous Consolidation (“Triage”)

Triage: analysis of pre-on-site data collection (e.g., documentation, questionnaire responses) to focus further on-site investigation (e.g., interviews) for continuous consolidation and feedback.





Practice Implementation Indicators

PP SP1.1-1:

Indirect work product:
-minutes of meetings at
which WBS was generated
or used to develop project
estimates

Primary work product:
-top-level WBS, with
revision history
-task descriptions
-work product
descriptions

Establish and maintain

a top-level work breakdown structure (WBS)

for estimating the scope of the project.

Indirect work product:
- project estimates aligned with
WBS elements

Affirmation:
- how is the WBS used?
- how are estimates generated?



Data Collection Sources

Instruments

- Organizational assets reflecting evidence of implementation of model practices (e.g., mapping tables)
- Questionnaires

Presentations

- Briefings, demonstrations

Documents

- Hardcopy, softcopy, hyperlinks

Interviews

- Standard structured interviews; on-call interviews; follow-up interviews
- Exploratory of focused questions targeted at practitioners and users



MDD v1.1 Outline (Planned)

Primary Reference

Front Matter

Introductory
Prose

Doc. Overview

Part1 Descriptive name
and information

Part2 Descriptive name
and information

...

Part N Descriptive name
and information

Executive
Summary for the
Appraisal Sponsor

Method Overview
with audience-
specific summary
of this document

Material

Phase I:
Appraisal
Planning

Phase II:
Conduct
Appraisal

Phase III:
Report
Results

Appendices

Elaborations and
Guidance

SCAMPI
Implementation
Model

Index with key
terms and threaded
reference trees

Tool kit full of
Templates and
work aids.



MDD v1.1 Architecture (draft)

- **Analyze Requirements**
- **Develop Appraisal Plan**
- **Select and Prepare Team**
- **Obtain and Analyze Preliminary Data**
- **Prepare for Data Collection**
- **Collect Data**
- **Record Data**
- **Verify and Validate Data**
- **Make Rating Judgments**
- **Deliver Appraisal Results**
- **Package and Archive Appraisal Assets**



Sample MDD v1.1 Format

3.1 Activity 1: Analyze Requirements

Purpose Understand business needs, objectives and constraints.

Entry Criteria Sponsor decides to perform an appraisal.

Inputs	Business requirements:	Resource constraints	Logistical constraints
	<ul style="list-style-type: none">• Business context• Sponsor objectives• Specific sponsor requirements	<ul style="list-style-type: none">• Personnel, facility, and project availability• Budget availability	<ul style="list-style-type: none">• Program plans• External schedule• Geographic constraints

Activities

- 1.1. Analyze Requirements
- 1.2. Determine Goals
- 1.3. Determine Constraints
- 1.4. Determine Target Process Capability
- 1.5. Determine Outputs and Intended Usage
- 1.6. Obtain Commitment

Outputs

Appraisal requirements
Goals
Constraints
Target Process Capability (TPC)
Rating baseline decision
Appraisal outputs list
Appraisal "Contract" (e.g., Sponsor "sign-off")
Appraisal requirements checklist

Outcome The decision to proceed with the appraisal, based on a shared understanding of the appraisal goals, constraints and scope.

Exit Criteria Appraisal checklist – requirements completed.

Example MDD activity description based on information mapping approach.

MDD processes contain the following, as applicable:

Purpose - Entry Criteria - Inputs - Steps - Outputs - Outcomes - Exit Criteria

Descriptions of activities

Detailed guidance and elaboration

Process monitoring description - tools and techniques - metrics - verification & validation - records - training

Tags and format are used consistently to aid navigation and references.



Topics	Summary / Examples	SCAMPI v1.1
Reuse	Validate prior results, reduce rediscovery of earlier proven findings.	Partial (Org. indicators)
Tools	Tool support is crucial for data reduction, consolidation, etc.	Partial (CAQ, OBS)
Observations	Too much time lost crafting observations.	High (Indicators)
Rating	Rate practices (implemented, partial, not implemented).	High (Characterization)
Pre-work	Thorough planning. Greater org. readiness. Pre-on-site data review. More effective questionnaire.	High (Org. indicators)
Training	Just-in-time training. “Live data” and tools for exercises.	Partial (Tailoring option)
Assets	“Look fors”, templates, checklists.	Partial (Method checklist)
Tailoring	Provide guidance on mandatory, suggested, optional, etc.	High (SIM Checklist)
Focused Investigation	Doc. review, interviews, consolidation, questionnaire analysis. Reduce discovery.	High (Triage)



Summary

ARC and SCAMPI v1.1 revisions currently in final stages of development and review

- Performance improvements
- Integrated appraisal method
- Detailed method definition and guidance

SCAMPI v1.1 improvements will enable the method to meet its performance requirements

- Shift from discovery to verification
- Integrated data collection and continuous consolidation
- Detailed method definition and guidance